REMARKS

Claims 1 and 7 have been canceled without prejudice. As an initial matter, Applicants note that there is no prior art rejection standing against claims 3-6.

The specification has been amended to correct a typographical error, wherein the preferred "electron donative dyestuff precursor," being an electron donative compound, was unintentionally referred to as a "reversible developer." It is plain from the specification, page 2, lines 6-20, and from Figure 1, that it is the electron donative dyestuff precursor that is an electron donative compound and not the reversible developer.

Applicants believe that the present amendment adds no new matter.

The Invention

The present invention pertains generally to reversible heat-sensitive paper and methods for writing on it. More specifically, in one preferred embodiment in accordance with the present invention, a method of writing information on a reversible heat-sensitive paper, is characterized by the steps of: (a) preparing a reversible heat-sensitive paper comprising a reversible heat-sensitive layer that comprises an electron donative dyestuff precursor and a reversible developer that colors and uncolors the electron donative precursor, by heating the reversible heat sensitive layer to a molten state and then quickly cooling to a solid colored state; and (b) heating a part of the reversible heat-sensitive recording layer to a color-erasing temperature range that is lower than the melting temperature of the reversible heat sensitive recording layer, wherein the part is uncolored and stores the information.

In another preferred embodiment in accordance with the present invention, a method of

writing information on a reversible heat-sensitive paper is characterized by the steps of: (a) preparing the reversible heat-sensitive paper comprising a reversible heat-sensitive recording layer that comprises an electron donative precursor and a reversible developer that colors and uncolors the electron donative precursor, formed on a supporting base; (b) irradiating the reversible heat-sensitive paper with light; and (c) heating an irradiated part so that the reversible heat-sensitive recording layer is heated to a molten state, then quickly cooling the irradiated part to produce a colored portion; (d) irradiating the colored portion with light partially in superimposition to produce a double irradiated portion, and uncoloring the doubled irradiated portion by maintaining the portion in a color-erasing temperature range that is lower than the melting temperature of the reversible heat-sensitive recording layer, for a predetermined time.

In another preferred embodiment in accordance with the present invention, a method of writing information onto a reversible heat sensitive paper is characterized by: (a) positioning an exposing mask between a light source and the reversible heat sensitive paper, and (b) transmitting light through the mask and focusing light on the reversible heat-sensitive paper, whereby two dimensional information is written.

In yet another preferred embodiment in accordance with the present invention, a method of writing information on a reversible heat-sensitive paper is characterized by the steps of: (a) providing a reversible heat-sensitive paper comprising a reversible heat-sensitive recording layer that comprises an electron donative precursor and a reversible developer that colors and uncolors the electron donative precursor, formed on a supporting base; (b) irradiating the reversible heat-sensitive paper with light to heat the paper; (c) selectively cooling a first portion of the paper at a

relatively slower rate to produce an uncolored portion; and (d) selectively cooling a second portion of the paper at a relatively faster rate to produce a colored portion.

The main advantage of the methods in accordance with the present invention is that a method for writing information on a reversible heat-sensitive paper is provided that allows two-dimensional information to be written within a shorter time, and the amount of information written, such as barcodes, can be increased.

The Rejection

Claims 1 and 3-7 stand rejected under 35 U.S.C. 112, first paragraph, as being based upon a non-enabling disclosure. Claims 1 and 7 stand rejected under 35 U.S.C. 103(a) as unpatentable over Applicants' statement of the prior art.

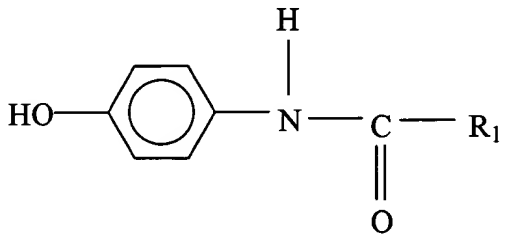
Applicants respectfully traverse the rejection and request reconsideration of the application for the following reasons.

Applicants' Arguments

Applicants point out that the present specification does comply with 35 U.S.C. 112, first paragraph, and enables one of ordinary skill in the art to make and use the claimed invention. Specifically, Applicants' specification provides ample information to direct one of ordinary skill in the art how to make and use the "reversible heat sensitive paper" that comprises (a) an "electron donative dyestuff precursor," and (b) a "reversible developer that colors and uncolors the electron donative precursor, by heating the reversible heat sensitive layer to a molten state and then quickly cooling to a solid colored state" as recited in claim 3. As shown in Figure 1, the electron donative dyestuff precursor is preferably a leuco dye; however, other electron donative

compounds (i.e., organic phosphonate compounds, α-hydroxy aliphatic carboxylate, aliphatic dicarboxylate, and alkylthiophenol, alkyloxyphenol, alkylcarbamoylphenol, or alkylgallate, with a carbon number of 12 or more) are suitable for this purpose (specification, page 8, lines 8-27).

Furthermore, Applicants have described a typical reversible developer as "a phenol-based compound with long chains in the alkyl group" (specification, page 2, lines 18-20) and subsequently describes the color forming/uncoloring property of the electron donative dyestuff precursor and reversible developer mix (specification, page 2, line 21 to page 3, line 7). This color forming/uncoloring property is described to be dependent on the rate of cooling (specification, page 2, line 21 to page 3, line 1). Applicants assert that one of ordinary skill in the art would recognize that the phenol-based compound with long chains in the alkyl group that is a reversible developer having color forming/uncoloring properties dependant upon the rate of cooling would belong to the family of compounds represented by



R_1 : Long alkyl chain

Applicants point out that the above family of reversible developer compounds have been well known in the art for almost ten years and are described in detail in the article titled "Rewritable Thermal Recording Material" (Proceedings of the 9th International Congress on Advances in Non-Impact Printing Technologies, pp. 413-416, 1993), by Y. Yokota (Exhibit B), hereafter referred to as the "Yokota article."

To further support Applicants' position that the above family of compounds are art recognized phenol-based compounds with long chains in the alkyl group that are reversible developers having color forming/uncoloring properties dependant upon the rate of cooling, Applicants submit a declaration by Y. Yokota filed in accordance with 37 C.F.R. § 1.132, hereafter referred to as the "Yokota Declaration."

The Yokota Declaration addresses the following issue of fact: are phenol-based compounds with long chains in the alkyl group that are reversible developers having color forming/uncoloring properties dependant upon the rate of cooling well known in the relevant art? The Yokota Declaration sets forth the fact that such compounds are described in the Yokota article from 1993, and are well known in the art. Clearly, this knowledge predates November 5, 1999, the filing date of the present application. Therefore, it is established that one of ordinary skill in the art would have known how to make and use the invention without undue experimentation because phenol-based compounds with long chains in the alkyl group that are reversible developers having color forming/uncoloring properties dependant upon the rate of cooling were commonly known in the art at the time of filing for a patent. *In re Vaeck*, 20 USPQ2d 1438, 1444. Applicants remind the Examiner that a declaration filed in accordance with 37 C.F.R. § 1.132 may establish the scope of knowledge of a person of ordinary skill in the art and must be fully considered when used to rebut a patentability issue under 35 U.S.C. 112. *In re Alton*, 37 USPQ2d 1578, 1584.

With respect to the Applicants' claims 3-6, no prior art rejection stands against these claims. Applicants have previously pointed out the shortcomings of the prior art (see Amendment

(A), page 12, lines 3-17). Therefore, for the reasons of record, claims 3-6, which are in compliance with 35 U.S.C. 112, are allowable.

Conclusion

Applicants have shown based on factual evidence (i.e., the Yokota Declaration and the Yokota article) that the specification as filed does enable one of ordinary skill in the art to make and use the invention in compliance with 35 U.S.C. § 112. Furthermore, no prior art rejection stands against these claims.

In view of the above, it is believed that this application is in condition for allowance, and the Examiner's prompt and favorable consideration is earnestly solicited. Questions are welcomed by the below-signed attorney for applicants.

Respectfully submitted,

GRIFFIN & SZIPL, PC

for Joerg-Uwe Szipl
Reg. No. 31,799

GRIFFIN & SZIPL, PC
Suite PH-1
2300 Ninth Street, South
Arlington, VA 22204
Telephone: (703) 979-5700
Facsimile: (703) 979-7429
Customer No.: 24203

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The reversible heat-sensitive recording material used in the present invention contains an electron donative dyestuff precursor and a reversible developer that colors the aforementioned electron donative dyestuff precursor, as the main constituents. A compound that is publicly known to be generally applicable to pressure-sensitive recording paper, heat-sensitive recording paper, etc. can be used as an electron donative dyestuff precursor, without any particular restrictions. In addition, the preferred electron donative dyestuff precursor~~reversible developer~~ is an electron donative compound such as organic phosphonate compound, α-hydroxy aliphatic carboxylate, aliphatic dicarboxylate, and alkylthiophenol, alkyloxyphenol, alkylcarbamoylphenol, or alkylgallate, with a carbon number of 12 or more. However, there are no particular restrictions provided the developer can reversibly change color tone. In addition, the compounds described in the laid-open Japanese patent No. 210954/1994, unexamined Japanese patent applications Nos. 160547/1193; 256825/1993; 317555/1993; 328101/1953; and 10310/1994 are especially preferred.